Introduction

Cassava (Manihot esculenta Crantz) is becoming an economically important crop for smallholder farmers in Laos. This crop not only provides poor farmers with food, feed, and income, but also act as catalysts that can transform subsistence farming into income-generating farming, allowing smallholder farmers to join the market economy. In Laos, major constraints in cassava production systems are the lack of improved varieties and appropriate agronomic practices, degraded soils, and poor access to markets. With financial support from the Nippon Foundation of Japan, research by CIAT and its national partners has been helping to alleviate these constraints by developing new technological options in the Lao PDR since 2004.

Objectives

- improving the productivity of cassava-based cropping systems
- improving the livelihoods of smallholder farmers in the uplands

Methodology

On-farm and on-station trials were tested using farmer participatory approaches to ensure that farmers were fully involved in the decision-making process. Improved cassava varieties and better agronomic practices were evaluated to show the effects of these alternative technologies on cassava yields and income.

Results

Promising highland cassava varieties

In March 2009, 6 promising breeding lines (selected from a total of 750 sexual seeds from crosses made at CIAT between varieties from the Latin American highlands) were selected from a Preliminary Yield Trial and replanted in the Advanced Yield Trial at 1,318 masl. Genotypes selected over two consecutive years in the Advanced Yield Trial will be considered as “elite genotypes” and incorporated in the germplasm collection and tested in FPR trials for possible release as new varieties adapted to highland conditions (Figure 1).

Improved high yielding cassava varieties

The introduced CIAT-related cassava varieties (eg. Kasetsart 50 and Rayong 72 from Thailand; KM 98-1 from Vietnam) have produced the highest fresh root yields as well as highest starch yields; these yields were significantly higher than those of the local varieties (Table 1).

Balanced fertilization practices

Application of balanced fertilizers significantly increased yields and net income. In Xieng Khouang province, the application of 25 kg N, 100 P2O5 and 100 K2O/ha produced a root yield by Kasetsart 50 of 26.2 t/ha as compared to 6.9 t/ha without fertilizers (net income over US$200 per ha as compared to US$50 per ha), versus 17.8 and 2 t/ha, respectively, by the local variety.

Effective soil erosion control

There is a clear indication that appropriate crop management practices (any type of hedgerows: Paspalum atratum or Tephrosia candica or pineapple) reduced soil loss by erosion to 40-60% of that obtained with traditional cassava growing practices (without hedgerows: dry soil loss 16.8 t/ha/year) (Figure 2). The cassava yields with hedgerows were increased by reduced losses of nutrients in the surface soil, reduced water run-off, and improved water infiltration and soil moisture contents.

Conclusions

In the Lao PDR, the introduced CIAT-related cassava varieties produce significantly higher yields in many parts of the country. Varieties better adapted to highland conditions and cold winters are being selected.

Farmers can get higher cassava yields and increase their net income by using balanced fertilization. Hedgerows markedly reduced soil loss by erosion where cassava was grown on sloping lands.

To get the greatest benefits and achieve impact, farmers need to be involved in the field trials and then adopt the varieties and practices most suitable for their own conditions. Successful adoption depends greatly on well-informed, farmer participatory decision-making made possible by good science and user-friendly research methodologies.

Urgent steps are necessary to increase yields, to improve the sustainability of production, and to reduce production costs, which will all have large positive impacts on the livelihoods of smallholder farmers.